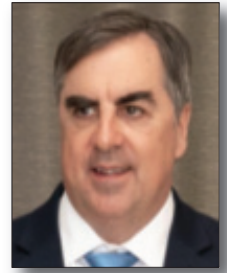


Risk Management Re-appraisal for AUKUS Submarine Plan-B

by **Kevin Beard**¹



A debate in the Australian Financial Review emerged recently between James Curran and Jennifer Parker on the merits and demerits of a “Plan-B” nuclear powered submarine proposed by an independent naval expert group. Their Plan-B is intended to supersede the ‘optimal pathway plan’ for the production of the SSN-AUKUS submarine in the UK and later in Australia. This article’s author is an engineer who proposes that, whilst the risks identified are genuine, a professional engineering approach obliges us to apply a Risk Management discipline in place of a single Plan-B.

Key words: Astute, AUKUS, Collins, denial, deterrence, Los Angeles (LA), management, RAN, risk, RN, strategy, USN, Virginia.

Introduction

In the Australian Financial Review (AFR 2024), James Curran reported on a naval expert group who criticise the viability of the ‘optimal pathway’ for production of the AUKUS nuclear submarine.² They cite issues with British industry that will delay construction, cause cost overruns, and make the claim of its operational limitations with a misleading assessment of only useful for “a war over Taiwan”.³ They also state that the British design “commits [Australia] to a complex construction process in three countries”. More realistically, they note that the Virginia Class submarines promised for sale to Australia in 2032, 2034 and 2038 may not be released by the United States Navy (USN) due to delays in the Virginia Class program, within which production continues below planned productivity levels. The group also contends that the ‘optimal pathway’ was more about achieving agreement to access US nuclear technology rather than a “practical process based on Australian requirements”. To address these risks the group proposes, in their “Plan-B”, that the future Block VII Virginia Class submarines be manufactured in Australia. The article begs a question: is “Plan-B” a valid risk management plan or simply advocacy for a favoured submarine design?

Both the expert group and Jennifer Parker’s response (AFR, 2024) are, at the highest level, discussing a primary risk that Australia would be unable to implement its National Defence Strategy (NDS,

2024). Potential causes include design and construction delays for the planned SSN-AUKUS⁴ boats and/or the US government delaying or cancelling transfer of Virginia Class submarines to the Royal Australian Navy (RAN). This may occur due to: technical issues in the SSN-AUKUS submarines, construction bottlenecks or UK priorities in their Dreadnought submarine production, inability of the Virginia class manufacturers to increase productivity or black-swan⁵ events that compel the Americans to retain their submarines. In fact, the list comprises four separate risks that may trigger the primary strategic risk. Each of these risks warrants a separate risk mitigation plan or even several risk plans, and there are many more risks requiring monitoring and treatment. A “Plan-B” is clearly insufficient for risk mitigation. Selection of the most appropriate risk mitigation plan is dependent on the occurrence of a specific risk, timing, context, and with what severity it occurs. Vice-Admiral Jonathan Mead RAN, rightly refers to the need for “an unwavering commitment to upholding the highest standards of safety, security, stewardship and safeguards, with all decisions underpinned by strong technical evidence” (Nicholson, 2024). Jennifer Parker states, fittingly, that it is “nonsensical to abandon an agreed plan with known risk, which is being treated, for an unconsulted plan with significant risk”. Therefore, this article discusses the sub-sea domain risks and risk plans through a broader risk management approach consistent with professional engineering principles. We commence with

¹The opinions expressed in this article are those of the author and not of the Royal United Services for Defence and Security Studies - Australia (RUSIDSS-A).

²The “Australia United Kingdom United States” security partnership.

³Like the Taiwanese HaiKun, a Dutch diesel-electric Zwaardvis (Swordfish) class design, other regional diesel-electric submarines such as the Collins Class would be equally effective in the shallow Taiwan Straits. Time on station limits are addressed by regional basing, for example in Guam. By comparison, SSNs have oceanic range and endurance for the entirety of the Indian and Pacific Oceans.

⁴The nuclear-powered attack submarines planned under the AUKUS agreement to be designed and constructed in Britain for the RN, then RAN, with remaining RAN boats to be constructed in Australia.

⁵A black-swan event is an unanticipated major event, such as the assassination of Arch-Duke Ferdinand on 28 June 1914 which escalated over a period of 37 days into World War I, or the Japanese attack on Pearl Harbor on 7 December 1941 that immediately brought the USA into World War II.

the primary risk of our incapacity to achieve our national strategy. What then is the national strategy?

Australia's Strategy

Last year's Defence Strategic Review (DSR) announced Australia's "strategy of denial", defined as "... a defensive approach designed to stop an adversary from succeeding in its goal to coerce states through force, or the threatened use of force, to achieve dominance." (DSR, 2023, 1) The National Defence Strategy (NDS) declared "denial" as Australia's "new approach" (NDS, 2024, 6-7). Retired Maj-Gen, Mick Ryan (CSIS, May 2024), observes that the Australian Defence Force (ADF) has long bandied about the words "*deter*" and "*deterrence*". In his view, "deterrence by denial" was always envisioned. The arrival of the RAN's first flagship, the battlecruiser *HMAS AUSTRALIA (I)*, established "deterrence" just ten months prior to World War I. Its 12-inch guns so dominated the 8.2-inch guns of Rear-Admiral Graf von Spee's Pacific fleet that, on sighting the New Zealand flag and troops on occupied German Samoa, they turned east to Chile. Deterred by technological superiority, Spee was denied his pre-war plan to attack coastal shipping in Australian and New Zealand waters and halt food exports to Britain (Overlack, ch. 11). Alternately, Sam Roggeveen's approach (*The Echidna Strategy*, 2023) would offer defence from a bristling Australian mainland. This strategy imposes the unfortunate consequence of drawing kinetic conflict closer to our own shores. Moreover, the "echidna strategy" fails to address the security of our extensive maritime trade lifelines. In November 1914 our Indian Ocean lines of communication were secured by *HMAS SYDNEY (I)* famously sinking the *SMS EMDEN* at the Cocos Islands. *EMDEN* had already disrupted Indian sea-trade, sank 16 merchant vessels, two warships, and destroyed the Madras (currently Chennai in India) oil depot. *SYDNEY*'s victory protected the nearby ANZAC convoy and averted a national catastrophe (Sondhaus, 87). Perhaps our best example of denial by force is that of Port Moresby in 1942. Its attempted occupation by the Japanese was denied by the combined actions of the Kokoda Campaign, the Battle of Milne Bay and the Battle of the Coral Sea. So, "denial by deterrence" and "denial by projected force" are Australia's long-standing strategies and they have proven to be effective.

Strategic Gap

Australia's economy is based primarily on trade, both exports such as minerals and food, and imports such as trucks and motor vehicles, and fuel oil from the Persian Gulf. Although Australia is a major food producer, we are dependent on petrol and diesel to move food from agricultural producers to the cities for consumption and wharves for export. These trade links are easily threatened and interdicted, as they were during the two world wars, potentially causing

starvation and industrial collapse. Australia is no longer threatened by the steam powered cruisers noted above but by predatory nuclear attack submarines (SSN) and nuclear armed ballistic missile submarines (SSBN). India, authoritarian Russia, and communist China all possess these submarines. China is also building a sizable fleet of aircraft carriers, destroyers and landing helicopter docks (LHD). Whilst P8 aircraft might defend our shores from the SSNs and SSBNs, their range is limited and they lack stealth. Australia needs a capability similar in deterrence and protection to the old *HMAS AUSTRALIA* and *SYDNEY*. The Commonwealth has negotiated the construction of up to eight SSN-AUKUS submarines, currently in design, to meet this need. However, these submarines will not be commissioned until the 2040s. Consequently, Australia remains without strategic deterrence nor ability to project force against adversaries capable of 30 knots and long endurance. With a top speed of 20 knots and short endurance, our diesel-electric submarines cannot follow or intercept the carriers, SSNs or SSBNs. Our inability to assert sea control, exposes the vulnerability of Australia's internet sea-cables, maritime commerce and projected forces. The RAN's surface combatants can be tracked by satellite and are too under-armed to project force in *SYDNEY*'s vigorous manner, thus lack deterrence. The expert group are right to be concerned as this means that the RAN is unable to properly implement Australia's national strategy until at least 2038. This 'strategic gap' is Australia's primary risk.

Strategic Gap Risk Plan 1 – Optimal Pathway - Virginia Class

The 'optimal pathway' incorporates two elements intended to cover Australia's strategic gap. Firstly, the Royal Navy (RN) and United States Navy (USN) will rotate Astute and Virginia class submarines through the RAN's Fleet Base West in Perth. This will facilitate RAN crew training and experience in support of these nuclear submarines. In 2032 and 2034, mid-life Virginia Block IV submarines will be delivered to the RAN. Only in 2038 a new Virginia Block VII will be delivered to the RAN, enabling operation of one nuclear submarine year-round.⁶ Typically, the second submarine is in deep maintenance and the third in set-to-work for the next operation. The RAN will, therefore, have no nuclear submarines before 2032 and only a part-time effective strategy until 2038. The USN has a long-term plan for 66 SSNs, including 17 next generation boats. They currently operate 21 Virginia, three Seawolf plus 24 Los Angeles (LA) Class attack submarines (O'Rourke, 2024, 3). Ultimately, their goal is 49 Virginia Class attack submarines. (Labs, 2022, 4) Five to seven of the LA Class are planned to be refuelled, their usage

⁶Block IV are in-service vessels launched by 2018 which have a vertical launch system but lack the additional Virginia Payload Modules (VPM) of the Block V (2019) and later Virginia Class boats (O'Rourke, 10-11).

extended by about ten years. A two-year Engineering Refuelling Overhaul (ERO) is required to extend the lifespan. Seventeen unrefuelled remain, eight of which have planned decommissioning dates. A planned seven refuelled LA class boats only brings operational SSNs to 31 (Hooper, *Forbes*, 2021). Another three launched, but not yet commissioned, Virginia class boats can be added. This means that another five additional LA class boats of the unretired nine would need to be refuelled to provide the USN a mid-term fleet of attack submarines. Disquietingly, the necessary 2.33 per year Virginia Class production rate will not even reach 1.5 per year until end 2024 (O'Rourke, 44). These figures suggest that the USN will fall short of attack submarines numbers and may not be willing or able to provide three to the RAN in the 2030s. As a consequence, additional risk mitigation plans to provide alternatives for some or all of the three Virginias are sensible.

Risk Plan 2 –Collins Class Construction

Along with a delay risk with the UK priority for their Dreadnought Class, there is also for Australia a production risk of the SSN-AUKUS to consider. Despite the great achievement of establishing submarine construction in the 1990s, we have not built a submarine since 2002. Further, the maintenance philosophy for the six Collins Class submarines and its funding by our Defence Department has been questionable. A 'Son-of-Collins' has been suggested but is as vulnerable to problems and delays as the SSN-AUKUS or Astute boats. Despite an agreement with Kockums, a new Collins construction requires engagement with the Kockums/HDW intellectual property through new owners TKMS (Yule, 2008, 315-17). Construction of a seventh Collins submarine without redesign would avoid delays relating to technical novelty. Both concepts would have the benefit of rebuilding skills and infrastructure in Australia prior to the SSN-AUKUS build, but there is just one glaring problem. As diesel-electric submarines they provide neither the deterrence nor projected force of an SSN. Because of their need to operate from and charge batteries, their lower speed, short endurance, and brief time on station, their operations are more limited than nuclear powered submarines. An SSN can endure long transits at 30 knots underwater and so stalk or intercept attack submarines, ballistic missile submarines, a carrier fleet or an adversary's commerce.

Risk Plan 3 – Astute Class from RN

A potential substitute for the Virginia Class boats is to request an in-service Astute Class boat from the RN or one drawn from the last two still under construction. In fact, this was Scott Morrison's original request, which was rejected, but evolved into the 'optimal pathway' plan. The change of government in the recent British election may create opportunity, particularly with the new Labour Government's rather familiar sounding 'Strategic Defence Review' (UK MOD, 2024). What

would they do for Australia? *HMAS SHROPSHIRE* is familiar from naval history as it was gifted by the RN to the RAN at the height of World War II to replace *HMAS CANBERRA* lost at the Battle of Savo Island. I believe that, in similar circumstances, such support would again come from the RN to quickly close the 'strategic gap'. Curiously, some of the expert group's critique of the SSN-AUKUS seems to have been conflated with the early Astute Class construction problems. Vickers Shipbuilding and Engineering had been denuded of skilled staff by a shipbuilding hiatus prior to its acquisition by GEC-Marine. GEC's Prime Contract Office struggled with the design and with the 3D computer aided design software CADD5. BAE purchased GEC in 1999 and in 2002 set up its Sea Systems Group to manage the program. Finding that there was no integrated master plan, BAE Systems introduced Earned Value Management (EVM) and bought over a team from Electric Boat supported by 100 CAD designers in the US (Gates, 2023). These efforts stabilised Astute's cost and schedule. However, various boats experienced from three to five years further delays beyond this new baseline (*The Lookout*, 2023, Part A). The high likelihood of the SSN-AUKUS program experiencing similar delays is a valid risk worth monitoring.

Risk Plan 4 – Australian built Astute Boat

Resourcing skills and Ministry of Defence scope changes were significant issues from the time of Vickers through to BAE takeover of the Astute program. To mitigate resourcing and inexperience risks and perhaps the potential absence of the second or third Virginia Class submarine at the same time, an Astute Class boat could be the first constructed in Australia, preferably with the design frozen. This would require a PWR-2 reactor but that also mitigates against technical and delay risks for the new PWR-3 reactor to be installed on the new Dreadnought and SSN-AUKUS classes.⁷ However, there is an issue with industrial capacity in the UK for their reactors and other production items. This is where Australia could make a contribution by investing in UK reactor production capacity, something that cannot be undertaken in Australia. This would also mitigate against delays in the future SSN-AUKUS boats. The RAN operating Astute boats would necessitate training on the Astute Combat Management System and would necessarily incur the purchase cost of sufficient British Spearfish torpedoes, as the Astute does not use the American Mk-48s. The incurred cost would be in the hundred-million-dollar range rather than the potential billions in delays and cost overruns on the SSN-AUKUS program where

⁷The first British SSN was provided a nuclear propulsion module by the Americans. The first British designed reactor was designated the PWR-1 (pressure water reactor) used up to the Trafalgar class. PWR-2 was a redesign for the Astutes. PWR-3 is currently in design to provide a new reactor for the Dreadnought and SSN-AUKUS classes (Gates, 109-111).

resource unavailability, technical incapacity and inexperience may arise. One or two Australian Astute boats would not be orphans as they have a knowledge, maintenance and spares base in Britain. Ultimately, they could be transferred back to the RN, if they needed to increase their fleet.

Risk Plan 5 – LA Class from USN

Perhaps, there is one risk mitigation plan that has been largely overlooked. Whilst it has been proposed that the RAN purchase a few of the retiring or refurbished American LA Class boats, this could be the least effective approach due to the problem of the RAN crewing these boats. In a ‘Pearl Harbor’ moment, the USN could call on its many veterans of the LA Class submarines to augment and train crews, maintain the boats, and to build up the necessary number of attack submarines for their navy. With this lateral-minded approach, the Virginia Class submarines might still be delivered to the RAN as planned! Notably, the potential for an earlier delivery of Virginia Block IV boats to the RAN could also be facilitated. In the worst case, LA Class boats could be transferred to the RAN but their older BSY-1 Combat System would require as much re-training as the Astute combat system. More concerning is the need for maintenance of their very much older hulls and equipment. As noted above, the nearly exhausted fuel rods of the LA class reactors limit their operational lifetimes which may be insufficient for useful RAN operation, or simply take too long to refuel and refurbish (Hooper, 2021). Arguably, Australia does not yet have the industrial capacity to put these boats to sea.⁸ Its better the US dockyards, the USN and its veterans maintain these boats.

Risk Plan 6 – Plan B – Virginia Block VII

The “expert group” proposed a single risk mitigation plan designated “Plan-B” (Curran, 2024). This ‘leap to solution’ constitutes a favoured Virginia Class Block VII submarine rather than a risk plan, but should be included. The Block VII is indeed an impressive concept but, as yet, none have been constructed. Its production is also likely to fall foul of the production delays that would delay delivery of the Block IV boats to the RAN in the 2030s jeopardised by the very same risks. The existing ‘strategic gap’ to 2032 is unlikely to be closed by this approach. The idea of manufacturing an updated design as Australia’s first build is fraught with all the risks that the group rightly notes about the SSN-AUKUS program. A considerable obstacle to building the Virginias in Australia, but not the Astutes, is that BAE is now Australia’s ‘submarine constructor’. Whether both Electric Boat and Huntington Ingalls Industries will agree to their intellectual property and industrial

competitiveness to be handed over to BAE is dubious. Whether the US government would also agree from sovereignty and security perspectives, and the UK government concur with the loss of opportunity for British industry is a considerable diplomatic question. As Jennifer Parker points out (*The Strategist*, 2024), a diplomatic foray like this could undermine all the international goodwill and confidence fostered within AUKUS thus far.

Appraisal of Risk Plans

Risk Plan 2, a new Collins boat is the easiest to eliminate as it is incapable of meeting our strategic needs. Risk Plan 1, the Optimal Pathway, magnificently meets our strategic needs by 2038, but only part-time from 2032. There is much extant work required to even make that happen. Skills development, crew training and infrastructure need to be stood up. Availability of an existing Astute (Risk Plan 3) very much depends on the willingness of the UK government of the day to transfer an Astute boat to the RAN. An Astute build in Australia (Risk Plan 4) would incur delays, be over budget and experience considerable issues, but the whole point is to resolve these issues for a smoother SSN-AUKUS build. It could also facilitate an earlier RAN nuclear submarine than SSN-AUKUS. LA Class submarines are old and probably beyond the capability of Australian dockyards to get them and keep them up to speed. In Risk Plan 5, the USN refurbishment and crewing of LA Class boats could mitigate against construction delays so facilitating Virginia Block IV boats to be handed over to their trained RAN crews. Risk Plan 6 (Plan-B) has no diplomatic or commercial foundation. The Block VII Virginia is a, hitherto, unbuilt design, and is sooner delivered off an American production line than an Australia one.⁹ Plan-B suffers to a greater extent all the risks and disadvantages that the expert group ascribes to the SSN-AUKUS.

Conclusion

Vice-Admiral Jonathan Mead’s safeguards of technical proficiency led us to a professional engineering approach via risk management, rather than leaping to favourite solutions. Thus based, we explore multiple risk mitigation plans, each mitigating many risks. No commitment to any single risk plan is relevant until risk trigger(s) and specific circumstance(s) guide us to the most effective plan(s). Identification of significant delays in either or both of the SSN-AUKUS or Virginia Class production lines would constitute valid triggers. A change of policy by a US administration might constitute another. Risk Plan 4 to have BAE build an Australian Astute boat would then be the most pragmatic risk mitigating approach. However, in dealing

⁸Australian industry would not have the capability yet to achieve the rigorous SUBSAFE certifications for the LA Class boats.

⁹Block VII may be of the same design as Blocks V and VI but that is uncertain at present.

with risks, we must be concerned that an 'Archduke Ferdinand' or a 'Pearl Harbor' moment would constitute an emergency trigger. In these circumstances, Risk Plan 5 LA Class with USN veteran crews constitutes the best plan to deliver Virginia Class boats to the RAN or/and Risk Plan 3 the transfer of an in-service Astute boat from the RN. Perhaps, a combination of risk plans may be appropriate. The main plan at present remains the 'optimal pathway' that delivers three rather impressive Virginia class submarines to the RAN. Given our national memory of two world wars, even in the most successful scenario, we cannot forget that Australia's 'strategic gap' is unsecured until 2032 and not assured until 2038.

The Author

Kevin Beard began his experience with submarines briefly as an undergraduate at RANTAU and later at Krupp Atlas Elektronik during the Oberon Class refit. He spent five years at Rockwell Systems Australia on the Collins Combat System Program, leaving as Lead Software Quality Assurance Engineer. At BHP Information Technology, he was Project/Systems Engineer for the Mainpac maintenance management software implemented on *HMAS BRISBANE (II)*, *TOBRUK* and *SUCCESS*. Kevin was trained in and practiced Risk Management as an IT Project Manager for BHP IT, Computer Sciences Corporation, Telstra, QBE and Sydney Water. Career highlights include managing construction of the 2007 Bigpond Email Platform and a project nominated for an Interactive Emmy, both at Telstra. In retirement, Kevin studies Australian military history.

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